

REMARKS

Claims 1-17 remain in this application. Claims 1, 3, 7, and 15 have been amended to more properly define the invention. The amendments are supported by the specification. No new matter has been added. The Applicants respectfully request reconsideration of this application in view of the above amendments and the following remarks.

Abstract

The Examiner has objected to the abstract for its recitation of the legal phraseology "means". The Applicants have amended the abstract, as required.

Drawings

The Examiner has objected to the drawings under 37 C.F.R. 1.83(a). In particular, the Examiner has required that the features recited in claim 7, namely rotary vacuum generator, rotor, and compression chamber, be shown in the drawings or cancelled from the claim. The Applicants respectfully submit that the vacuum unit 770 shown in Figure 7 and the discussion at page 21, lines 21-28 (that the vacuum unit may be a typical rotary vacuum generating device containing a chamber with a suction vent, exhaust vent, and a motor to rotate rotors within a compression chamber and draw gas through the suction vent and expel gas through the exhaust vent) should be sufficient to give a proper understanding of the invention consistent with 37 C.F.R. 1.83(a). However, in order to expedite allowance of the case, the Applicants have amended claim 7 to recite the vacuum unit that is shown in Figure 7. Accordingly, amended claim 7 is believed to comply with the Examiner's requirement.

35 U.S.C. §112 Rejection

The Examiner has rejected claims 1-14 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicants regard as the invention.

Claim 1 has been amended to remove the recitation "substantially", so that the claim only recites that the compositions are different, and to remove the recitation "particular".

In further regards to claim 1, the Examiner has stated that the recitation "a vent to add a first gas to the enclosure and to remove a second gas from the enclosure" is ambiguous and indefinite. The Applicants respectfully disagree and provide the following definition of the term vent for the Examiner's convenience and reference (Random House Webster's Unabridged Dictionary, Second Edition, Copyright 1998, ISBN:0-375-40383-3).

vent¹ (vent), *n.* 1. an opening, as in a wall, serving as an outlet for air, smoke, fumes, or the like. 2. an opening at the earth's surface from which volcanic material, as lava, steam, or gas, is emitted. 3. Zool. the anal or excretory opening of animals, esp. of those below mammals, as birds and reptiles. 4. the small opening at the breech of a gun by which fire is communicated to the charge. 5. a means of exit or escape; an outlet, as from confinement. 6. expression; utterance; release: *to give vent to one's emotions*. 7. Obs. the act or fact of venting; emission or discharge. —*v.t.* 8. to give free play or expression to (an emotion, passion, etc.): *to vent rage*. 9. to give public utterance to: *to vent one's opinions*. 10. to relieve by giving expression to something: *He vented his disappointment by criticizing his successor*. 11. to release or discharge (liquid, smoke, etc.). 12. to furnish or provide with a vent or vents. —*v.i.* 13. to be relieved of pressure or discharged by means of a vent. 14. (of an otter or other animal) to rise to the surface of the water to breathe. [1350-1400; (v.) ME *venten* to furnish (a vessel) with a vent, by aphesis < OF *esventer* (*es-* *ex-* + *-venter*, *v.* deriv. of *vent* < L *ventus* *WIND*¹), in later use deriv. of the E *n.*; (n.) partly < F *vent* (< L *ventus*), partly by aphesis < F *évent* (OF *esvent*, deriv. of *es-venter*), partly deriv. of the E *v.*] —**vent**²*less*, *adj.*

The Applicants also respectfully point out that the specification and the claims further clarify the term vent to allow adding a first gas and removing a second gas from the enclosure. For example, the Examiner is respectfully directed to Figures 2, 5, and 6, and the associated text in the specification, which show and describe vents according to various embodiments of the invention. Figure 2 of the specification shows a vent 244 that allows a purge gas to be added to the enclosure and initial gas removed from the enclosure. The particular vent 244 includes a first inlet opening 245 and a second outlet opening 246 to add and remove gas. Figure 5 of the specification shows a vent 528. The vent 528 including an inlet 520 including a first port 521, second port 522, third port 523, fourth port 524, and an outlet 530 including a first port 531, second port 532, third port 533, fourth port 534, fifth port 535. Figure 6 of the specification shows a vent 631 that includes a first opening 632, a second opening 636 on a side opposite the

first opening, a third opening 634, and a fourth opening 638 opposite the third opening. Accordingly, the present recitation is believed to particularly point out and distinctly claim that which the Applicants regard to be the invention, as required by 35 U.S.C. §112, and the Applicants respectfully request that the Examiner withdraw the rejection and pass the claims into allowance.

Claim 3 has been amended to remove the recitation "having a higher concentration of the first gas than the enclosure and a lower concentration of the second gas than the enclosure", as required by the Examiner.

35 U.S.C. §102(e) Rejection - Klebanoff et al.

The Examiner has rejected claims 1, 4-6, 10, 12, 13 and 15 under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,153,044 to Klebanoff et al. (hereinafter referred to as "Klebanoff").

As an initial matter, the Applicants respectfully request that the Examiner reconsider examining the application under the amendments to 35 U.S.C. §102(e) made by the American Inventors Protection Act (AIPA) of 1999. The present application was filed on December 29, 2000, which is after November 29, 2000.

As amended, claim 1 recites an apparatus comprising at least "a wall to connect the mask protective device with the patterned mask, the mask protective device, the patterned mask, and the wall defining a gas-filled enclosure" and "a vent to add a first gas to the enclosure and to remove a second gas from the enclosure, the first gas having a different gas phase composition than the second gas". The Applicants respectfully request reconsideration of the prior rejection of claim 1 for at least the reason that Klebanoff does not teach or suggest: (1) the wall to connect the mask protective device with the patterned mask; (2) the patterned mask together with the mask protective device and the wall defining a gas-filled enclosure; nor (3) the vent to add the

first gas to the enclosure and remove the second gas having a different gas phase composition from the enclosure.

Firstly, Klebanoff does not teach or suggest a wall to connect the mask protective device with the patterned mask. As clearly shown in Klebanoff's Figure 1, the walls 110 of thermophoretic pellicle 100 enclose the reticle 120. This is also discussed at column 4, lines 63-67. Accordingly, the walls enclose the reticle they do not connect to it. Clearly Klebanoff does not anticipate this limitation.

Furthermore, the Applicants respectfully submit that it may not be proper to modify Klebanoff in order to connect the walls and the reticle for at least the reason that such modification may decrease the effectiveness of thermophoresis. Klebanoff primarily discusses "[A] system that employs thermophoresis to protect lithographic surfaces from particle deposition" (see abstract). Thermophoretic forces operate to cause particles to be driven from regions of higher gas temperature to regions of lower gas temperature (column 2, lines 44-46). As discussed in Klebanoff, one of the critical features associated with thermophoresis generally and with the thermophoretic pellicle in particular is that "a temperature gradient must be developed in the gas resident between the surface of the lithographic component being protected from particle deposition and its surroundings" (see column 3, line 67-column 4, line 5). Klebanoff discusses the separation distance between the walls and the reticle as one of the significant parameters affecting thermophoresis, "[T]he inventors have shown that in the configuration shown in FIG. 1, wherein the distance between the surface being protected and the proximate enclosure wall is 1 cm, the temperature difference between the two is 10 K, the interior pressure is 30 mTorr, and the operating pressure in chamber 105 is <5 mTorr, it is possible to reduce deposition of particles greater than 0.03 μm in diameter by a factor of about 10^6 " (column 9, lines 49-56). It seems likely that connecting the highly conductive walls to the reticle would induce thermal conduction that would cause the walls to rapidly reach the same temperature as the heated reticle and reduce

if not eliminate thermophoresis, which would not be desirable. Accordingly, such a modification of Klebanoff would seem inappropriate.

Secondly, Klebanoff does not teach or suggest a patterned mask that together with the mask protective device and the wall define a gas-filled enclosure. As discussed above, Klebanoff's reticle 120 is enclosed within the walls 110 and does not participate in defining an enclosure.

Thirdly, Klebanoff does not teach or suggest a vent to add a first gas to an enclosure and remove a second gas having a different gas phase composition from the enclosure. The Applicants have carefully reviewed Klebanoff and found absolutely no discussion of gas composition, whatsoever. The concept of using gas flow for the purpose of changing gas composition within the enclosure appears to be completely foreign to Klebanoff. Instead, Klebanoff discusses a gas flow for sweeping and directing particles away from the reticle surface. The Examiner appears to have interpreted the prior claim language to read upon the possibility that the outlet gas flow may contain more particles than the inlet gas flow. Applicants respectfully disagree with this interpretation inasmuch as it seems inconsistent with the plain meaning given to a composition of a gas. However, in order to expedite allowance of the case, the Applicants have amended claim 1, without prejudice, to make it clear that the first gas has a different gas phase composition than the second gas. This is not taught or suggested in Klebanoff.

Accordingly, Klebanoff does not teach or suggest the limitations of claim 1, and claim 1 is believed to be allowable. Claims 2-14 depend from claim 1 and are believed to be allowable therefor as well as for the recitations independently set forth therein.

Claim 15 recites an apparatus comprising at least "a wall to connect the mask protective device with the patterned mask, wherein the mask protective device, the patterned mask, and the wall define an enclosure" and is believed to be allowable for similar reasons. Claims 16-17 depend from claim 15 and are believed to be allowable therefor as well as for the recitations independently set forth therein.

35 U.S.C. §103(a) Rejection - Klebanoff In View Of Wang

The Examiner has rejected claims 2 and 16 under 35 U.S.C. §103(a) as being unpatentable over Klebanoff (U.S. Patent No. 6,153,044) in view of U.S. Patent No. 5,453,816 to Wang et al. (hereinafter referred to as "Wang"). Without admitting the appropriateness of the combination of Klebanoff and Wang, claims 2 and 16 depend from claims 1 and 15, respectively, and as discussed above are believed to be allowable therefore as well as for the recitations independently set forth therein.

35 U.S.C. §103(a) Rejection - Klebanoff et al.

The Examiner has rejected claims 3, 7-9, 11, 14 and 17 under 35 U.S.C. §103(a) as being unpatentable over Klebanoff (U.S. Patent No. 6,153,044). Claims 3, 7-9, 11, and 14 depend from claim 1, and claim 16 depends from claim 15, and as discussed above, these claims are believed to be allowable therefore as well as for the recitations independently set forth therein.

Additionally, the Examiner has asserted that "supplying inert gas having less absorption spectrum in the exposure wavelength and high transmissivity of the photolithographic radiation, such as nitrogen, argon, etc. ... is well known per se". The Applicants submit that this is not well-known in the context of these claims. If the Examiner persists in this rejection, it is respectfully requested that a reference be provided in support of this submission.

Conclusion

The Applicants respectfully submit that the restriction requirement has been overcome by the amendment and remark, and that the claims as amended are now in condition for allowance. The Examiner is requested to call Brent E. Vecchia at (303) 740-1980 if there remains any issue with allowance of the case.

Request For An Extension Of Time

The Applicant respectfully petitions for an extension of time to respond to the outstanding Office Action pursuant to 37 C.F.R. § 1.136(a) should one be necessary. Please charge our Deposit Account No. 02-2666 to cover the necessary fee under 37 C.F.R. § 1.17 for such an extension.

Charge Our Deposit Account

Please charge any shortage to our Deposit Account No. 02-2666.

Respectfully submitted,

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Date: July 29, 2002

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In The Abstract:

Please replace the abstract beginning at page 32, line 2, with the abstract:

-- A method and apparatus are described for removing an initial gas from a gas-filled enclosure between the mask-protective device, such as a pellicle, and the patterned mask, such as a reticle, and adding a purge gas with a different composition. The gas-filled enclosure includes a vent for adding the purge gas to the enclosure and removing the initial gas from the enclosure. Adding and removing may be accomplished by using pressure, diffusion, or vacuum [, or other means]. --

In The Claims:

1. (Amended) An apparatus comprising:

a mask protective device including a transparent portion that is transparent to a photolithography radiation;

a patterned mask including a pattern defined at least in part by an opaque portion that is opaque to the [particular] photolithography radiation;

a wall to connect the mask protective device with the patterned mask, the mask protective device, the patterned mask, and the wall defining a gas-filled enclosure; and

a vent to add a first gas to the enclosure and to remove a second gas from the enclosure, the first gas having a [substantially] different gas phase composition than the second gas.

3. (Amended) The apparatus of claim 1, further comprising a gas source [having a higher concentration of the first gas than the enclosure and a lower concentration of the second gas than the enclosure and] connected with the vent to add [the] a first quantity of the first gas to the enclosure through the vent.
7. (Amended) The apparatus of claim 1, further comprising a vacuum unit [rotary vacuum generator, the rotary vacuum generator including a rotor and a compression chamber] to reduce the total pressure inside the enclosure to below 500 millimeters of mercury.
15. (Amended) An apparatus comprising:
 - a mask protective device including a transparent portion that is transparent to a [particular] photolithography radiation;
 - a patterned mask including a pattern defined at least in part by an opaque portion that is opaque to the [particular] photolithography radiation;
 - a wall to connect the mask protective device with the patterned mask, wherein the mask protective device, the patterned mask, and the wall define an enclosure; and
 - a gas filling the enclosure, the gas having a transmissivity of the photolithography radiation greater than that of [the] surrounding ambient air.